Applications of NOAA MODIS Near Real Time Data

Fire Products

Fire Pixels

NOAA MODIS near real time has added an additional product to their suite, the PGE30 Fire Product. Because the application of near real time processing was so valuable for the Montana forest fires in 2000, NOAA is now processing US coverage of forest fires. The fire product is shown as a red square on the diagram for contrast appearances.

The fire product is color coded to the level of confidence of the calculated product. At this time (December 2001) the NASA science code always gives medium confidence to all the fire pixels. Also observe smoke and plumes present where there are no fire pixels. NASA is currently investigating this anomaly. The light blue line is an artifact of the NASA processing code, which uses an optional previous data granule. Because NOAA processes each data granule in parallel for speed, the previous data granules are not available for this additional processing.

MT Forest Fire

MODIS has been shown to be applicable to the average US citizen by being instrumental in helping save lives and property during a national disaster. During the weeks around Labor Day 2000, forest fires in Montana and Idaho prevented reconnaissance flights because of heavy smoke and fire. The MODIS sensor was optimal for this need because it is sensitive in both visible and infrared wavelengths and has the capacity to detect hot flames on the surface even through smoke and clouds. The MODIS instrument has a higher resolution (0.25 km) than the traditional AVHRR (Advanced Very High Resolution Radiometer) instrument data (1km). This improved resolution helped monitor smoke dispersion, which is a critical issue for the health of those living in the area.

VA Forest Fire

On November 1, 2001, forest fires broke out in Shenandoah National Park in Virginia. The extent of the fires was such that the plume could be seen from space with the MODIS instrument. The opaque white part of the plume in this image is approximately 6 miles in length.

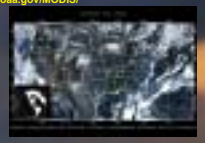
Web

http://www.osdpd.noaa.gov/MODIS/

Web Calendar

http://www.osdpd.noaa.gov/MODIS/CONUS/index_CONUS.html

NOAA MODIS NRT developed a Web calendar to quickly evaluate coverage and quality of the data. The images are created from the red, green, and blue spectral bands from the data. The Web pages cater to the NANOOK production coverage, which is CONUS (displayed), Alaska, and Hawaii.



CONUS

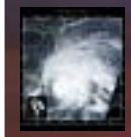
This is an example of the full image shown thumbnail size on the Web page. The image is created by mosaicing several granules together. The green squares represent the fire product, which is overlaid on top of the visible bands.

Afghanistan

Afghanistan

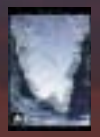
The Air Force Weather Administration (AFWA) has taken an interest in NOAA MODIS NRT time because it images Afghanistan in near real time. This military interest has expedited the installation of our new system, which will process greater coverage and at a faster rate.

Air, Earth, Water Products



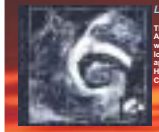
Hurricane

This image is from October 5, 2000, where Hurricane Keith, clearly pictured, swept across Mexico.



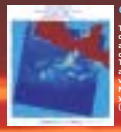
Ice

NOAA MODIS NRT produces a daily ice product. Below is a visible spectrum image of Greenland showing the detail of our products.



Low Pressure

This image is from August 12, 2001, where a spectacular low-pressure area appeared over the Hudson Bay in Canada.



Chlorophyll

This image was taken over Central America and displays the chlorophyll product. Two NOAA agencies are currently validating this data. NASA science has not yet been validated (December 3, 2001).

Performance

Bandwidth

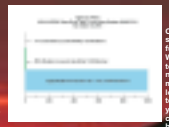
This graph shows how quickly MODIS products grow in size and bandwidth. Currently our products for CONUS are 70 GB. Our future proposed coverage with full products is 400GB. If you multiply that by the number of customers (for example, 10), then 4,000 GB worth of data need to be transferred daily.

Ancillary Data

Because NANOOK is an NRT System, we need ancillary data at midnight that morning for that day's processing. Our current supplier is anywhere from 15 hours (for GDAS) to 5 days late sending the data files. Alternate resources are currently being investigated.

Granule Dropouts

NOAA MODIS NRT typically does not receive (on average) 50 granules out of 288 granules daily. This loss may be due to incorrect time ordering of the packets, bad data lines, but often we miss several granules in a transmission. EDOS, who transmits our RBD, is currently investigating the matter. This graph does take into account back-filled data supplied by EDOS.



Network

Our current bandwidth (1.5 Mbits/sec) is a trickle compared to our future bandwidth (1,000 Mbits/sec) We have had funding for 1.5 years to support the installation of this network. However, because of merging of phone companies in the local area and high demand for high-tech dark fiber, this project has not yet broken ground. Completion is currently projected for the second half of 2002.

Performance Highlights

- Timeliness of ancillary and raw data is critical for creating NRT products.
- MODIS data are unusually large.
- Moving large files multiple times consumes limited bandwidth.
- Current standard network speed is miniscule compared to future GB capabilities.